MiniBooNE Beam-Dump Run Status

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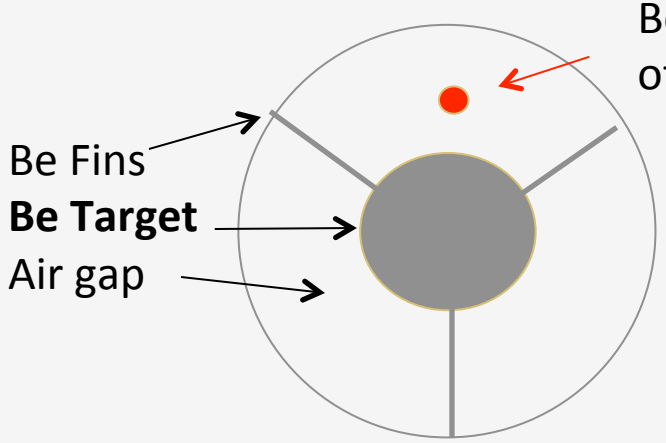
For the MiniBooNE Collaboration

Outline

- Beam-Dump Run Goals/Motivation
- BNB/Detector run status
- Summary

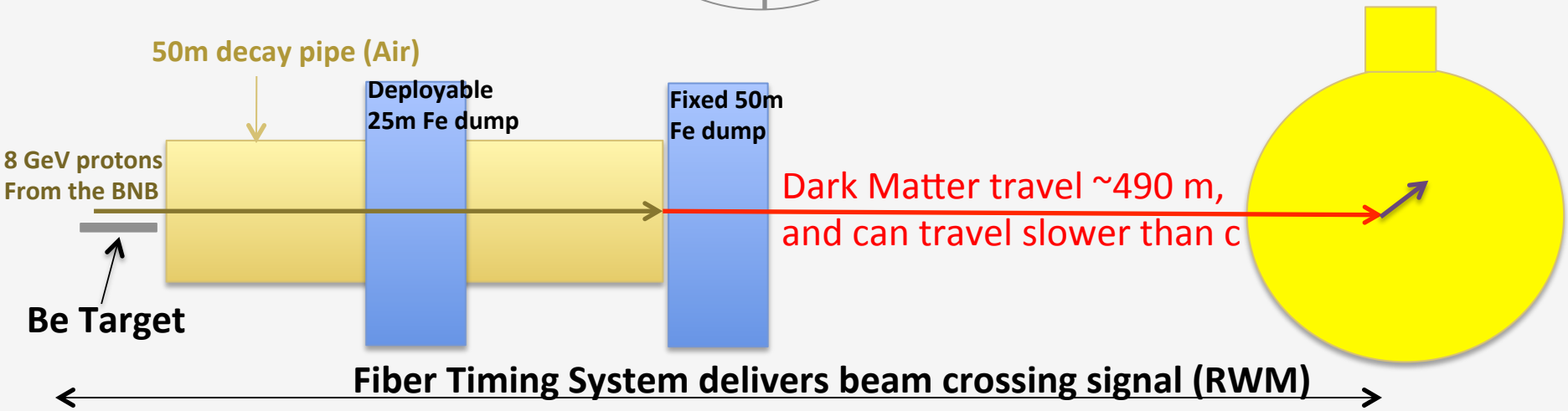
Beam Off Target Running (Beam-Dump Mode)

MB has the capability to steer the protons past the target and onto the 25m or 50m iron dump



Beam spot position in beam off target mode (~1 mm spread)

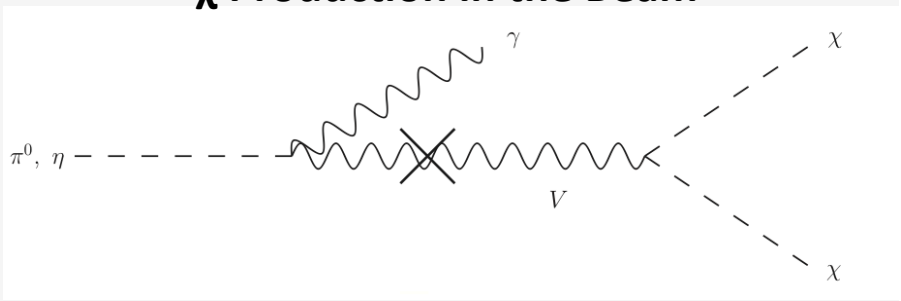
-Target is 1 cm diameter
-Air gap between target and horn inner conductor is ~1 cm



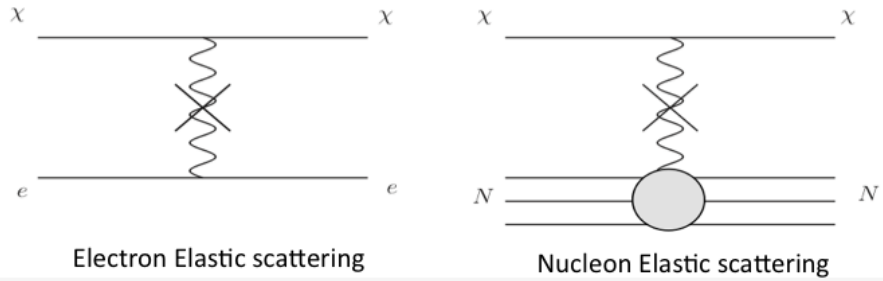
- π^0 and η produced by protons in the Fe quickly decay producing dark matter.
- Charged mesons are absorbed in the Fe before decaying, which significantly reduces the neutrino flux (still some production from proton-Air interactions).

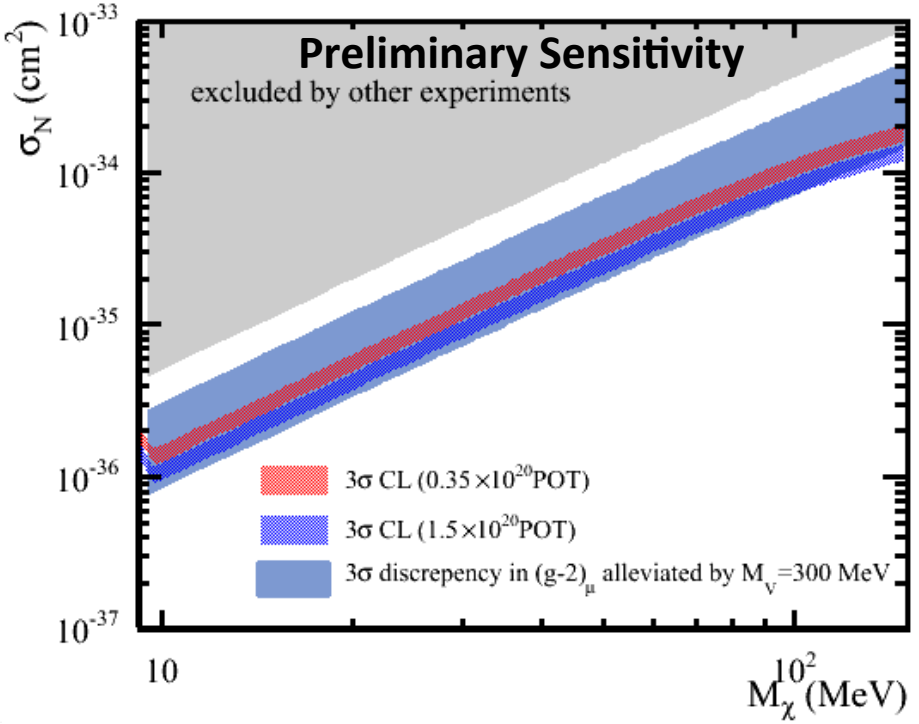
3σ C.L. Sensitivities for Dark Matter-Nucleon Scattering in 50m Beam-Dump Mode

χ Production in the Beam



χ Scattering in the Detector

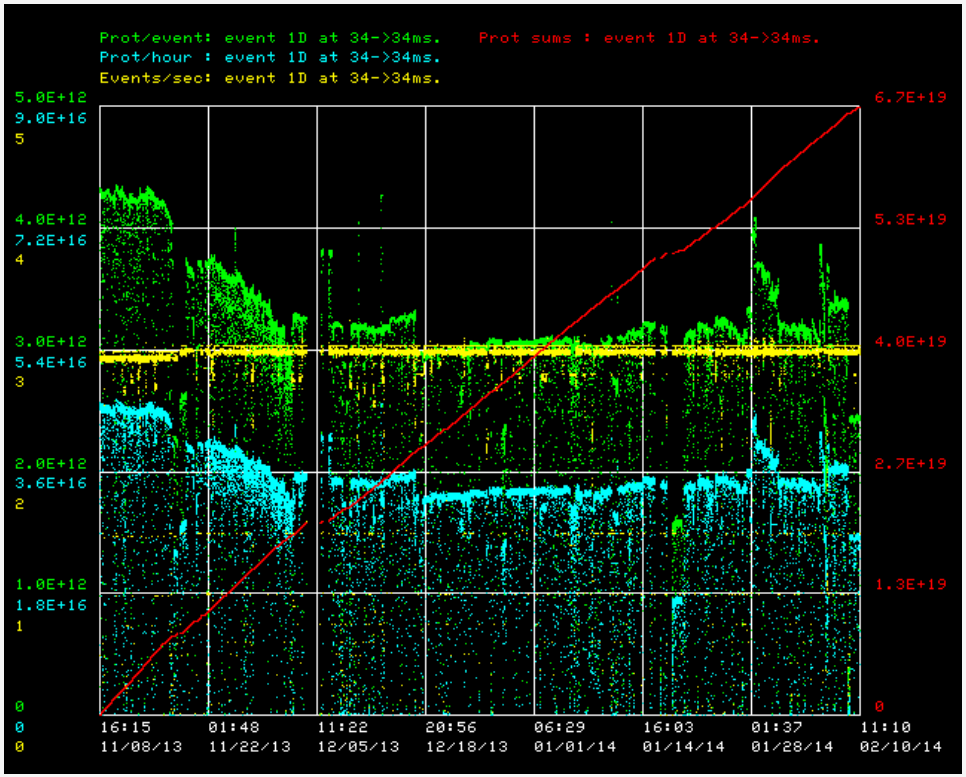




- Cover g-2 region below M_x < 200 MeV with 1.5x10^{20} POT.
- 0.35x10^{20} POT test run has verified background estimates.
- Plan to run Beam-Dump till MicroBooNE turns on in neutrino mode. We keep the beam-line tuned up and ready to go.

BNB Beam-Dump Run Status

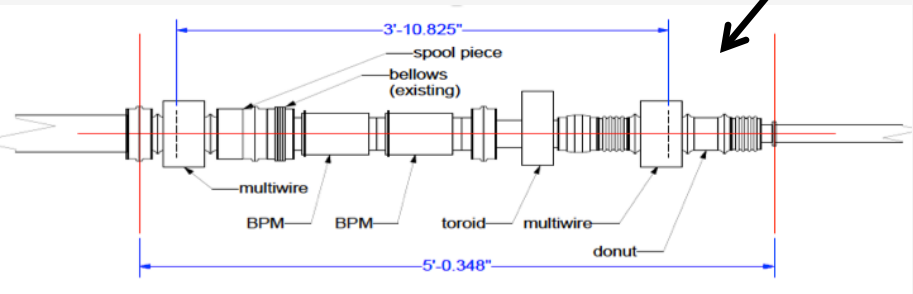
- Started running beam off target mode Nov 8, 16:15 CST, Run 34840.

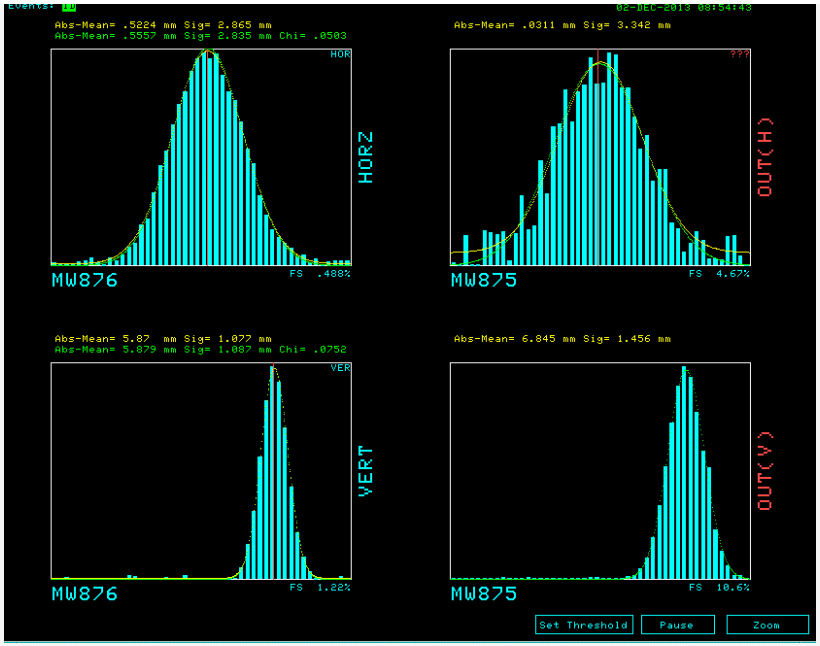


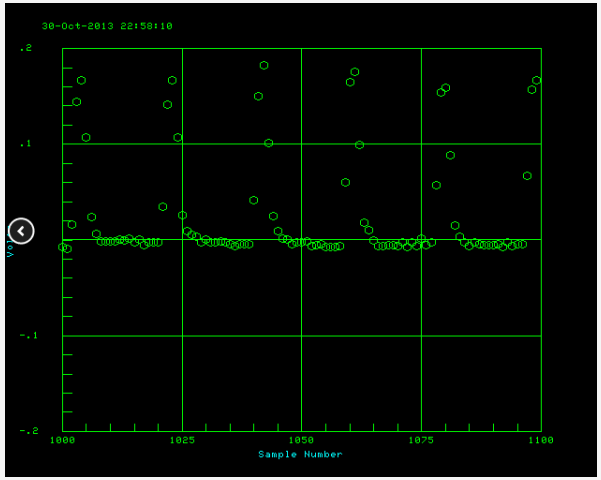
- Stable BNB running at 3Hz, 3.1E12 ppp, 3.2E16 p/hr, 5E18 p/week.
- In the last couple weeks intensity has bumped up about 10% as Booster RF stability improves.
- Collected a total of 6.7E19 POT, running well.

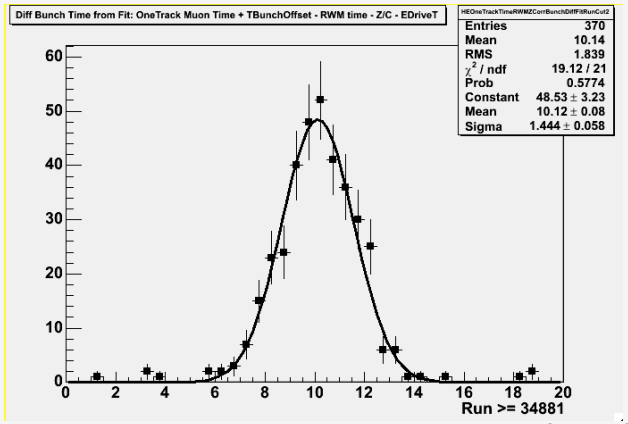
New BNB Hardware Commissioned

- New low mass dual multiwires 875 and 876 commissioned and working well.







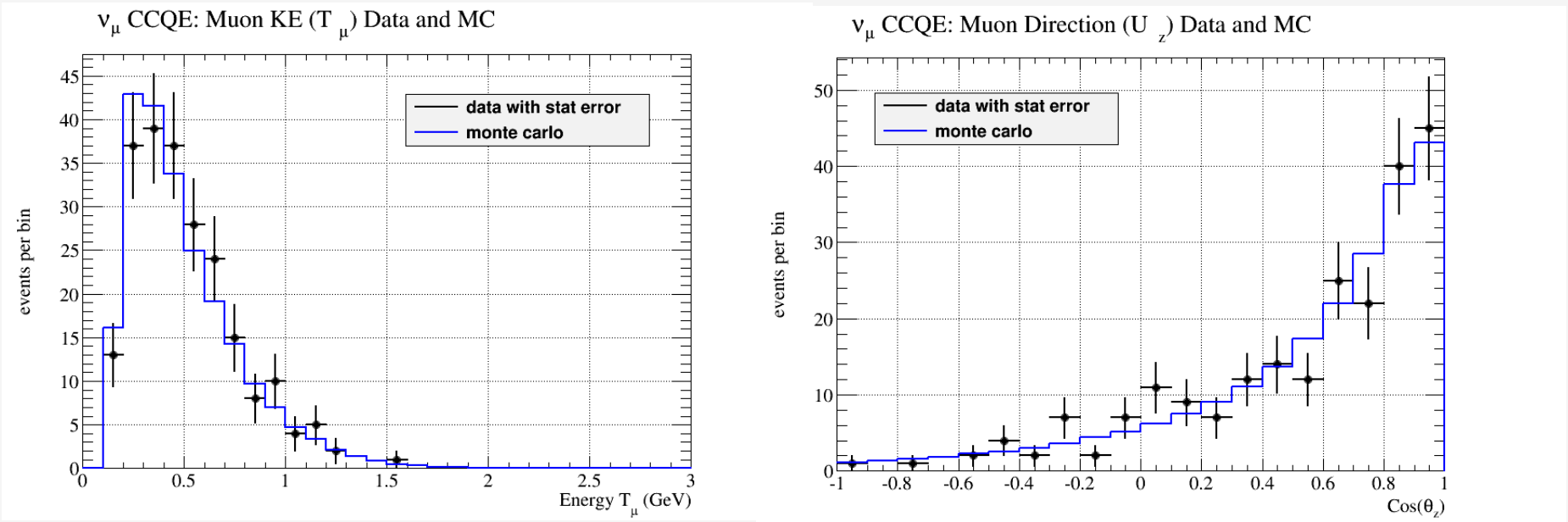


Event Time Relative to Beam Bunch (nsec)

- New Resistive Wall Monitor waveform digitizer working, data saved in IF database.
- New Fast Fiber RWM timing system working. Improved muon neutrino timing from 2.0 nsec to 1.5 nsec.

Muon Neutrino Rate Reduction in Beam-Dump Mode

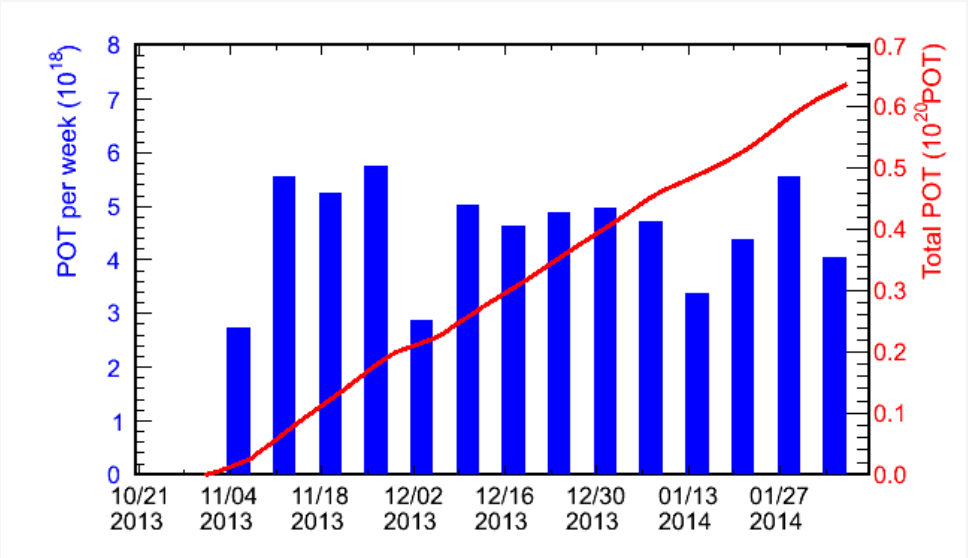
- Estimated neutrino rate reduction:
  - **DATA**: 50m absorber test beam off target run (3.19x10^{19} POT):
    (events/POT)$^{\nu\ mode}$/(events/POT)$^{beam\ off\ target}$ = **44 ± 3 (stat error)**
- Detector oil, PMT gains, calibrations, and event reconstruction response identical to before long shutdown.



Beam-Dump mode Muon neutrino energy/angle response

Summary

- Run going well. Booster+BNB delivering stable POT at ~5e18 POT/week.
- Detector response stable, similar to before long shutdown.



- Total POT collected 0.67E20 POT.
- Dark matter search analysis goal ~1.5E20 POT.